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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/370,508	08/06/1999	UMESH SHARMA	20944.9000	8186

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EXAMINER

DEO, DUY VU NGUYEN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 07/03/2003

28

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/370,508

Applicant(s)

SHARMA ET AL.

Examiner

DuyVu n Deo

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10, 14-18, 20-24, 26 and 28-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 6-10, 14-18, 20-24, 26 and 28-31 is/are rejected.
- 7) ☒ Claim(s) 2-5 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 10, 14, 26, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adkisson et al. (US 6,030,541) and Wolf et al. (Silicon Processing for the VLSI Era, Vol.1).

Referring to claims 10, 14, Adkisson teaches a method of forming a semiconductor device comprising: depositing a layer of polysilicon (claimed polycrystalline silicon) on a substrate (col. 5, line 50-52); depositing an oxide layer from TEOS of about 100-1000 angstrom over the polysilicon (col. 3, line 65-col. 4, line 10); depositing an oxynitride layer of about 100-2000 angstrom over the oxide layer (col. 4, line 10-14); depositing a resist pattern over the oxynitride (col. 5, line 24-25); patterning the oxynitride layer (col. 5, line 25, 26) and the polysilicon (col. 5, line 50-51); removing the oxynitride by using phosphoric acid (col. 5, line 40-42). Unlike claimed invention, Adkisson doesn't describe removing the oxynitride without subjecting the oxynitride to any temperature greater than about 400 degrees Celsius after the step of depositing the layer of silicon oxynitride. Since Adkisson teaches that there are only steps of processing the resist between depositing and removing the photoresist and it is conventional that the processing of photoresist is done with T that is under 400 degrees Celsius, as evidently

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supported by Wolf (pg 429-455, pg 518), it would have been obvious to one skill in the art in light of Wolf's teaching of processing the photoresist, the method would inherently not having any step that would subject the silicon oxynitride to any temperature greater than about 400 degree Celsius between the deposition and removing the oxynitride layer.

3. Claims 1, 6, 7, 18, 20, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adkisson and Wolf and further in view of Lee (US 5,620,913).

Unlike claimed invention, Adkisson doesn't describe forming an interpoly nitride dielectric and a second poly layer. Lee describes a method for forming a flash memory comprising the steps of forming an interpoly dielectric, including a nitride layer, and a second poly layer; and patterning the stack to form a gate electrode (col. 5, line 55-col. 6, line 10). It would have been obvious for one skill in the art to modify Adkisson's method in light of Lee's teaching because Adkisson teaches a method for forming a gate structure (col. 5, line 54) and his invention can be applied to other and different embodiments (col. 3, line 25-27) and one example of a gate structure is taught by Lee in order to form a gate electrode (col. 6, line 15-24) with a reasonable expectation of success.

Referring to claim 1, the combined method would include etching the antireflective oxynitride, polysilicon, and the interpoly nitride to form a gate electrode.

Referring to claims 7, 20 Adkisson describes the oxynitride is deposited by CVD using N<sub>2</sub>O and SiH<sub>4</sub> (col. 4, line 18-20).

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4. Claims 8, 9, 15-17, 21-22, 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adkisson/Wolf, or Adkisson/Wolf/Lee as applied to claims 1, 14, 20, 28 above, and further in view of Cheung et al. (US 5,968,324).

Cheung teaches a method of forming oxynitride using  $\text{SiH}_4$  and  $\text{N}_2\text{O}$  wherein the ratio between them is about 1.0 and Cheung further teaches that the refractive index, absorptive index, and thickness for different wavelengths can be controlled by varying the parameters and the rate at which the gases are introduced (col. 3, line 1-5; col. 4, line 1-33). It would have been obvious at the time of the invention for one skill in the art to deposit the oxynitride in light of Cheung because Cheung further teaches controlling the parameters for the deposition of the oxynitride that is used by above Adkisson in order to control the refractive index, the absorptive index, and the thickness of the oxynitride.

5. Claims 24, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adkisson/Wolf or Adkisson/Wolf/Lee as applied to claims 18, and 26 above, and further in view of Fu et al. (US 6,245,682).

Referring to claims 23, and 31, etching the oxynitride using hot phosphoric acid is well known to one skill in the art. Fu teaches etching the oxynitride using hot phosphoric acid (100-150 degree Celsius) (col. 5, line 23-31). Therefore, it would have been obvious for one skill in the art to modify above prior art in light of Fu because these condition would etch the oxynitride faster than the under oxide layer as taught by Fu.

6. Wolf is cited to show that RIE of insulator (such as silicon oxide) is known and available to one skill in the art (pages 539-542).

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 18 recites the limitation "the device" in line 8. There is insufficient antecedent basis for this limitation in the claim.

***Response to Arguments***

9. Applicant's arguments with respect to claims 1-10, 14-18, 20-24, 26, 28-31 have been considered but are moot in view of the new ground(s) of rejection.

***Allowable Subject Matter***

10. Claims 2-5 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 2-5 are allowable because prior art doesn't describe forming a layer of insulator on the edge prior to the step of removing the remaining antireflective coating.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD

June 29, 2003

